



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

PLANETARY PHENOMENA FOR MAY AND JUNE,
1896.

BY PROFESSOR MALCOLM MCNEILL.

MAY, 1896.

Mercury is an evening star throughout the month, coming to its greatest eastern elongation, $22^{\circ} 9'$, on May 16; during the entire month it remains above the horizon more than an hour after sunset, and about the middle of the month nearly two hours. This is the best time of the year for seeing it as an evening star. The distance from the Sun is not as great as it was during the preceding greatest west elongation, but during the greater part of the month the planet is several degrees north of the Sun, and this retards its setting quite a number of minutes. It moves rapidly eastward in the constellation *Taurus*. On May 9th it passes eight degrees north of the first-magnitude star α *Tauri*, and on May 19th it passes three degrees south of the second-magnitude star β *Tauri*. Toward the close of the month, the distance between planet and Sun diminishes rapidly.

Venus is still a morning star, but it is so near the Sun that it is no longer conspicuous, rising only about half an hour before the Sun at the close of the month. It moves eastward and northward among the stars from *Pisces*, through *Aries*, into *Taurus*, and on May 31st is about four degrees south of the *Pleiades*.

Mars is slowly creeping away from the Sun, and rises a little earlier than before. It is continually coming nearer to us and gaining in brightness, but the change is very slow, and it will not be as near to us as is the Sun until September. Its apparent motion among the stars is east and north, about twenty-five degrees in the constellation *Pisces*.

Jupiter is still the most prominent object in the western sky in the evening, and sets about two hours earlier than it did during April. It moves about five degrees east and south in the constellation *Cancer*.

Saturn is getting into very good position for observation. On May 1st it rises just a little after sunset, and is above the horizon practically the entire night. It comes to opposition on the afternoon of May 5th. It is retrograding (moving westward)

in the constellation *Libra*, and moves toward its brightest star, α *Libræ*. The rings are apparently not as wide open as in March, owing to the change in our position with reference to their plane, due to the earth's orbital motion around the Sun. This closing up is only a trifle, about two per cent., and lasts only a few months. The general change in the appearance of the rings is a progressive increase in size of minor axis, until the maximum is reached in 1898, but there are periods of slight retrogression near each opposition.

Uranus is in the same neighborhood as *Saturn*, and comes into opposition on May 12. It moves slowly west in the constellation *Libra*, and is about halfway between α *Libræ* and β *Scorpii*.

Neptune is in the eastern part of *Taurus*, and sets very soon after the sun.

JUNE, 1896.

The Sun reaches the summer solstice, and summer begins on the afternoon of June 20th, about 2 P. M., P. S. T.

Mercury is an evening star, setting about an hour after the Sun on June 1st, rather too near to be easily seen, except under very favorable conditions of weather. It rapidly nears the Sun, passing inferior conjunction on June 8th, and becomes a morning star. It then moves rapidly away from the Sun, and by the close of the month is nearly out to the greatest west elongation, rising about an hour and a quarter before the Sun.

Venus is still a morning star, but is too close to the Sun to be easily seen. At the close of the month, it rises only a quarter of an hour before sunrise.

Mars is moving away from the Sun and rising earlier, before 1 A. M. on June 30th. It moves about twenty-three degrees east and north from *Pisces* into *Aries*, and is a trifle brighter than it was during May. It is in perihelion on the morning of June 12th. It is then about 128,000,000 miles distant from the Sun. Its distance from the Earth is about 10,000,000 miles more.

Jupiter is still conspicuous in the western sky, but is drawing too near the Sun for good telescopic observation. At the close of the month it sets at a little after 9 P. M. It moves about six degrees east and a little south in the constellation *Cancer*. On the afternoon of June 14th it is very close to the Moon, and in some places there will be an occultation, but the time of

nearest approach occurs during daylight for most of the United States.

Saturn is in excellent position for observation, being well above the horizon at sunset and not setting until long after midnight. It moves about one degree westward in the constellation *Libra*, and during the latter part of the month is very close to the brightest star of the constellation, the third-magnitude α *Libræ*. The nearest approach is on June 19th, when the planet passes about two degrees north of the star.

Uranus follows *Saturn* about eight degrees east and four degrees south, and lies about halfway between it and β *Scorpii*.

Neptune is very close to the Sun, passing conjunction and changing from an evening to a morning star on the evening of June 7th.

EXPLANATION OF THE TABLES.

The phases of the Moon are given in Pacific Standard time. In the tables for Sun and planets, the second and third columns give the Right Ascension and Declination for Greenwich noon. The fifth column gives the local mean time for transit over the Greenwich meridian. To find the local mean time of transit for any other meridian, the time given in the table must be corrected by adding or subtracting the change per day, multiplied by the fraction whose numerator is the longitude from Greenwich in hours, and whose denominator is 24. This correction is seldom much more than 1^m. To find the standard time for the phenomenon, correct the local mean time by *adding* the difference between standard and local time if the place is west of the standard meridian, and *subtracting* if east. The same rules apply to the fourth and sixth columns, which give the local mean times of rising and setting for the meridian of Greenwich. They are roughly computed for Lat. 40°, with the noon Declination and time of meridian transit, and are intended as only a rough guide. They may be in error by a minute or two for the given latitude, and for latitudes differing much from 40° they may be several minutes out.

PHASES OF THE MOON, P. S. T.

		H. M.
Last Quarter,	May 4,	7 25 A. M.
New Moon,	May 12,	11 47 A. M.
First Quarter,	May 19,	10 21 P. M.
Full Moon,	May 26,	1 56 P. M.

THE SUN.

1896.	R. A. H. M.	Declination. ° '	Rises. H. M.	Transits. H. M.	Sets. H. M.
May 1.	2 37	+ 15 19	5 4 A. M.	11 57 A. M.	6 50 P. M.
11.	3 15	+ 18 5	4 53	11 56	6 59
21.	3 55	+ 20 21	4 44	11 56	7 8
31.	4 35	+ 22 1	4 39	11 58	7 18

MERCURY.

May 1.	3 34	+ 20 58	5 39 A. M.	12 54 P. M.	8 9 P. M.
11.	4 42	+ 24 44	5 52	1 23	8 54
21.	5 25	+ 24 57	5 55	1 27	8 59
31.	5 35	+ 22 52	5 34	12 57	8 20

VENUS.

May 1.	1 28	+ 7 35	4 22 A. M.	10 48 A. M.	5 14 P. M.
11.	2 14	+ 12 3	4 14	10 55	5 36
21.	3 2	+ 16 3	4 7	11 3	5 59
31.	3 51	+ 19 24	4 4	11 13	6 22

MARS.

May 1.	23 6	- 7 24	2 52 A. M.	8 27 A. M.	2 2 P. M.
11.	23 34	- 4 31	2 30	8 15	2 0
21.	0 2	- 1 34	2 9	8 4	1 59
31.	0 30	+ 1 21	1 47	7 52	1 57

JUPITER.

May 1.	8 14	+ 20 35	10 21 A. M.	5 34 P. M.	12 47 A. M.
11.	8 19	+ 20 19	9 48	5 0	12 12
21.	8 25	+ 19 59	9 15	4 26	11 37 P. M.
31.	8 32	+ 19 36	8 44	3 53	11 2

SATURN.

1896.	R. A. H. M.	Declination. ° '	Rises. H. M.	Transits. H. M.	Sets. H. M.
May 1.	14 58	— 14 14	7 9 P. M.	12 20 A. M.	5 31 A. M.
11.	14 55	— 14 1	6 22	11 34 P. M.	4 46
21.	14 52	— 13 49	5 38	10 51	4 4
31.	14 49	— 13 39	4 56	10 9	3 23

URANUS.

May 1.	15 23	— 18 15	7 49 P. M.	12 45 A. M.	5 41 A. M.
11.	15 21	— 18 8	7 7	12 4	5 1
21.	15 19	— 18 2	6 22	11 19 P. M.	4 16
31.	15 17	— 17 56	5 41	10 38	3 35

NEPTUNE.

May 1.	5 2	+ 21 23	7 6 A. M.	2 22 P. M.	9 40 P. M.
11.	5 3	+ 21 25	6 26	1 43	9 0
21.	5 5	+ 21 27	5 49	1 6	8 23
31.	5 6	+ 21 30	5 11	12 28	7 45

ECLIPSES OF *JUPITER'S* SATELLITES, P. S. T.

(Off right-hand limb, as seen in an inverting telescope.)

	H. M.		H. M.
II, R, May 1.	6 50 P. M.	III, D, May 15.	8 8 P. M.
I, R, 2.	5 24 P. M.	III, R, 15.	11 42 P. M.
III, R, 8.	7 42 P. M.	I, R, 16.	9 15 P. M.
II, R, 8.	9 25 P. M.	I, R, 23.	11 10 P. M.
I, R, 9.	7 19 P. M.	I, R, 25.	5 39 P. M.

PHASES OF THE MOON, P. S. T.

	H. M.
Last Quarter, June 3,	12 2 A. M.
New Moon, June 11,	12 43 A. M.
First Quarter, June 18,	3 41 A. M.
Full Moon, June 24,	10 55 P. M.

THE SUN.

1896.	R. A. H. M.	Declination. °	Rises. H. M.	Transits. H. M.	Sets. H. M.
June 1.	4 40	+ 22 10	4 38 A. M.	11 58 A. M.	7 18 P. M.
11.	5 21	+ 23 9	4 35	11 59	7 23
21.	6 2	+ 23 27	4 37	12 2 P. M.	7 27
July 1.	6 44	+ 23 4	4 41	12 4	7 27

*Publications of the**MERCURY.*

1896.		R. A.	Declination.	Rises.	Transits.	Sets.
		H. M.	° '	H. M.	H. M.	H. M.
June	I.	5 35	+ 23 34	5 57 A.M.	12 53 P.M.	8 19 P.M.
	II.	5 16	+ 19 37	4 46	11 55 A.M.	7 4
	2I.	5 1	+ 18 15	3 56	11 0	6 4
July	I.	5 14	+ 19 31	3 25	10 34	5 43

VENUS.

June	I.	3 56	+ 19 41	4 4 A.M.	11 14 A.M.	6 24 P.M.
	II.	4 48	+ 22 5	4 7	11 26	6 45
	2I.	5 41	+ 23 27	4 15	11 40	7 5
July	I.	6 34	+ 23 41	4 27	11 54	7 21

MARS.

June	I.	0 32	+ 1 38	1 45 A.M.	7 50 A.M.	1 55 P.M.
	II.	0 59	+ 4 30	1 23	7 38	1 53
	2I.	1 26	+ 7 14	1 1	7 26	1 51
July	I.	1 53	+ 9 50	12 40	7 14	1 48

JUPITER.

June	I.	8 32	+ 19 34	8 41 A.M.	3 50 P.M.	10 59 P.M.
	II.	8 39	+ 19 7	8 11	3 18	10 25
	2I.	8 47	+ 18 38	7 41	2 46	9 51
July	I.	8 55	+ 18 6	7 12	2 15	9 18

SATURN.

June	I.	14 49	- 13 38	4 52 P.M.	10 5 P.M.	3 18 A.M.
	II.	14 47	- 13 29	4 10	9 24	2 38
	2I.	14 45	- 13 23	3 29	8 43	1 57
July	I.	14 44	- 13 20	2 48	8 2	1 16

URANUS.

June	I.	15 18	- 17 56	5 37 P.M.	10 34 P.M.	3 31 A.M.
	II.	15 16	- 17 50	4 55	9 53	2 51
	2I.	15 15	- 17 45	4 14	9 12	2 10
July	I.	15 14	- 17 41	3 34	8 32	1 30

NEPTUNE.

1896.		R. A.		Declination. °	Rises.		Transits.		Sets.	
		H.	M.		H.	M.	H.	M.	H.	M.
June	I.	5	6	+ 21 30	5	7 A.M.	12	24 P.M.	7	41 P.M.
	II.	5	8	+ 21 32	4	30	11	47 A.M.	7	4
	21.	5	9	+ 21 34	3	52	11	9	6	26
July	I.	5	11	+ 21 36	3	14	10	31	5	48

ECLIPSES OF *JUPITER'S* SATELLITES, P. S. T.

(Off right-hand limb, as seen in an inverting telescope.)

		H.	M.		H.	M.
I, R,	June 1.	7	35 P. M.	II, R,	June 9.	9 0 P. M.
IV, D,	2.	6	6 P. M.	I, R,	17.	5 53 P. M.
II, R,	2.	6	26 P. M.	IV, R,	19.	4 55 P. M.
IV, R,	2.	10	52 P. M.	III, R,	20.	7 42 P. M.
I, R,	8.	9	29 P. M.	I, R,	24.	7 48 P. M.

SOME LARGE PERTURBATIONS IN THE MOTIONS
OF CELESTIAL BODIES.*

The novice in astronomy often believes that the motions of planets and satellites take place with great regularity, according to KEPLER'S laws, and that the disturbances caused by their reactions upon each other are only slight. A closer investigation shows, however, that the "harmony of the universe" is often seriously disturbed. In seeking for the reasons of these phenomena, the mathematical theory of planetary motions has been materially furthered, and convincing proof has been furnished that its foundation,—*i. e.*, NEWTON'S law of attraction,—is correct. Although one of these disturbances was already known in the early stages of the planetary theory, yet such great mathematicians as LAGRANGE and EULER could not give a sufficient explanation of it. We refer to the motions of *Jupiter* and *Saturn*, in which great deviations were discovered, increasing with the time.

It remained for LAPLACE, the real founder of celestial mechanics, to discover the reason, namely; that the times of revo-

* From the January number, 1896, of *Himmel und Erde*. Translated for the Society by Mr. C. A. STETEFELDT.